

REMARKS

This responds to the Office Action mailed on January 23, 2007.

Claims 1-17 remain pending in this application.

§102 Rejection of the Claims

Claims 1, 3 and 7 were rejected under 35 USC § 102(e) as being anticipated by Ng (U.S. 5,994,217). Applicant respectfully traverses this rejection and requests the Office to consider the following.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” (*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), M.P.E.P. §2131, 8th Ed., Rev. 1).

In the ***Response to Arguments*** section, the Office again admits that “it is difficult to determine if 28 is on the recessed part of 32.” (Final Office Action at page 4). This admission is the quintessence of disqualification of the structure 28 to be the barrier layer structure. This is because it is well settled that “[a]nticipation requires the presence in a single prior reference disclosure of each and every element of the claimed invention, *arranged as in the claim.*” *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984) (citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)) (emphasis added). “The identical invention must be shown in as complete detail as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989); MPEP § 2131.

Applicant requests the Office to kindly but dispositively determine and demonstrate that “28 is on the recessed part of 32.” If the Office cannot, the rejection must be withdrawn.

The Office therefore has turned to layer 34 to meet the claim limitation of forming a conductive first diffusion barrier layer *above and on* the first interconnect ... [and]

But to select structure 34 as the barrier layer claimed by the Applicant, the Office has taken several untenable positions.

Firstly, layer 34 in Ng is not above and on the first interconnect (unlabeled Al-Si-Cu structure inserted into layer 20). “Above and on” means “in direct contact with”.

Secondly, the Office asserts that structure 34 *shall be* the “first diffusion barrier layer (layer 34, which directly contacts the layer 32 or 1TiN (sic) layer 28) above and on the first interconnect.” (Office Action at page 2). Again, the Office has admitted, in the language used by the Applicant that layer 34 is not above and on the first interconnect, because, to repeat “*the layer 32 or 1TiN layer 28 ... above and on* the first interconnect.” (Office Action at page 2. Emphases added).

Thirdly, claim 1 also requires

forming an upper recess in the upper ILD layer to expose the first conductive diffusion barrier layer

Herein lies another impossibility of the Office’s reading of the claims. This is because if the Office has chosen layer 34 shall be the claimed first diffusion barrier layer *above and on* the first interconnect, layer 34 is in no wise above and on the first interconnect.

The Office continues by interpreting the “metal layer 48” (Ng’s language) as “an upper interconnect 48 in the upper recess” (Id). This interpretation is manifestly false. The “upper recess” has to be the structure depicted inserted into the layer 40, and the Office’s “upper interconnect 48” in the first place is a trace, not an interconnect, and in the second place is not in the upper recess.

Applicant has read and understood the Final Office Action. In response to the Final Office Action and the *Response to Arguments* (Office Action at page 4), Applicant respectfully asserts that Ng teaches a TiN barrier layer 28, but it is not formed above and on the Al-Si-Cu interconnect, which must be read as the first interconnect (required by Applicant’s claim 1). Instead, the TiN barrier layer 28 is *below* and on the Al-Si-Cu interconnect, and the metal line 32 is above and on the Al-Si-Cu interconnect. Because Applicant claims a process in claim 1, this is not an anticipatory teaching by Ng. Ng does not teach how the Al-Si-Cu structure (interconnect) at the level of layer 20 is formed. In any event, when the metal layer 28 is formed it is neither formed above and on an interconnect, nor below and on. Rather as to teaching a process, Ng merely teaches, if at all, forming an interconnect that breaches layer 28. And the

sequence Ng teaches is also not enabling since as claim 1 requires forming the conductive first diffusion barrier layer above and on the first interconnect.

The only teaching of an etch that breaches layer 28 is given at column 4, lines 61-62: “the metal layer 28 32 34 is etched using chlorine containing gas” Ng does not teach forming the recess into which is located the Al-Si-Cu structure at the level of layer 20. Ng is therefore devoid of any enabling teaching. One cannot determine whether the layer 28 is formed above and on the Al-Si-Cu structure, followed by an etch. Neither can one determine whether the layer 28 is formed immediately following the formation of layer 24, in which case layer 28 would coat layer 24 in the recess in which is located the Al-Si-Cu structure. FIG. 6 in Ng is also indefinite because layer 28 has no boundary definition coplanar with the Al-Si-Cu structure. Because Ng is not enabled to teach the chronological formation of the layer 28, Ng cannot be enabled to teach “forming a conductive first diffusion barrier layer above and on the first interconnect ...” (Claim 1). Because Ng does not anticipate claim 1, withdrawal of the rejections is respectfully requested.

The Office Action has a statement in a previous Office Action that is difficult to understand. It states, “[c]learly, in figure 6, the contact is formed in each of the ILD’s to expose the barrier layer (sic)” Because the phrase ends without punctuation, it is not clear to Applicant’s counsel if the phrase was intended to end with the word “layer”. And the assertion is not germane to the limitation of claim 1 of a method to “expose the first conductive diffusion barrier layer” because in Ng, the upper via can only expose layer 34, not the “first conductive diffusion barrier layer”. Withdrawal of the rejections is respectfully requested.

Claims 3 and 7 depend from claim 1. Because Ng does not anticipate claim 1, Ng also does not anticipate claims 3 and 7. Withdrawal of the rejections is respectfully requested.

§103 Rejection of the Claims

Claims 2, 4-6 and 8-17 were rejected under 35 USC § 103(a) as being unpatentable over Ng. Applicant respectfully traverses the rejection and requests the Office to consider the following.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vacck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (M.P.E.P. § 2143 8th Ed, Rev.1).

Applicant has read and understood the Final Office Action. The Final Office Action admits that “Ng lacks anticipation only in not teaching that an organic ILD may be used and that the barrier layers may be formed by electroless plating.” (Office Action at page 4). That the Office Action asserts that “Ng suggests that the metal layers may be formed by other metal processes” (Office Action at page 4), represents a non-enabling invitation to experiment. The statement further refers to the “metal processes” which neither teaches nor suggests anything regarding an organic ILD. Since all the elements the claims are admitted not to be found in the cited reference, and since the rejection is based upon a single-reference action, Applicant respectfully asserts that all the claim limitations are not taught.

Because the Office is asserting something without a teaching or suggestion found in the cited reference, Applicant assumes the Office is taking official notice of the missing elements from an undisclosed source. Applicant respectfully objects to the taking of official notice, and pursuant to M.P.E.P. § 2144.03, Applicant traverses the assertion of official notice and requests that the Office cite a reference that teaches the missing element. If the Office cannot cite a reference that teaches the missing element, applicant respectfully requests that the Office provide an affidavit that describes how the missing element is present in the prior art. If the Office cannot cite a reference or provide an affidavit, Applicant requests withdrawal of the rejections.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (801) 278-9171 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Reservation of Rights

In the interest of clarity and brevity, Applicant may not have addressed every assertion made in the Office Action. Applicant's silence regarding any such assertion does not constitute any admission or acquiescence. Applicant reserves all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicant does not admit that any of the cited references or any other references of record are relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicant timely objects to such reliance on Official Notice, and reserves all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicant reserves all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of

priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

Respectfully submitted,

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